

REMARKS

Claims pending in the instant application are numbered 1-21. Claims 1-21 presently stand rejected. Claim 1 has been amended. Claims 2 and 5 have been cancelled without prejudice. The Applicants respectfully request reconsideration of the present application in view of the amendments and the following remarks.

35 U.S.C. § 102 and § 103 Rejections

Claims 1-3, 5 and 16-18 are rejected under 35 U.S.C. § 102(b) as being anticipated by Huang et al., U.S. Patent Number 5,956,598. Claims 1 and 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Lin et al., U.S. Patent Number 6,194,285. Claims 1-7, 17-18 and 21 are rejected under 35 U.S.C. § 102(e) as being anticipated by Pan, U.S. Patent Number 6,322,634. Claims 8-10 and 19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Pan in view of Binkley et al., U.S. Patent Number 6,022,671. Claims 11-12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Pan in view of Ido et al. (WO 98/37445). Claim 13 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Pan in view of Nakos et al., U.S. Patent Number 6,054,745. Claims 14-15 and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Pan in view of Kleinknecht, U.S. Patent Number 4,039,370.

Claim 1 as presently amended expressly recites “isotropically etching additional portions of the material from the region of the material to sharpen the corner.” Thus, the instant claims expressly recite isotropically etching additional portions of the material. The expressly claimed isotropic etch to sharpen the corner.

Huang is directed to fabricating a structure with a rounded corner in integrated circuits (col. 2, lines 59-62). Huang discloses forming a trench 306 through a dry-etching process (col. 4, lines 1-5). Huang also discloses a pre-liner cleaning process of trench 306 that removes part of pad oxide layer 302 to form a sharp corner 307 (col. 4, lines 5-14), but Huang does not disclose an isotropic etch to remove portions of the pad oxide layer.

Additionally, Huang discloses an isotropic wet etch of oxide layer 310 that forms a groove 312 (col. 4, lines 45-49.) This groove causes the sharp corner 307 to be exposed. However, this isotropic wet etch does not etch additional portions of the sharp corner 307 to sharpen the sharp corner 307 (col. 4, lines 49-54.) Thus, Huang fails to disclose, teach or fairly suggest “isotropically etching additional portions of the material from the region of the material to sharpen the corner” as expressly claimed in the Applicants’ invention.

Further, Huang expressly teaches away from creating a sharp corner, as expressly claimed by the Applicants. Huang discloses “if this sharp corner 307 is not rounded, it causes the resultant IC device to suffer from a kink effect that considerably degrades the performance of the resultant IC device” (col. 4, lines 30-34). Thus, Huang teaches away from “isotropically etching additional portions of the material from the region of the material to sharpen the corner” as expressly claimed in the Applicants’ invention.

Lin is directed to forming a shallow trench isolation (STI) having reduced junction leakage. Lin discloses a trench corner 17 is formed when trench 45 is etched in substrate 10 (col. 1, lines 49-52). Lin also discloses that trench corner 17 becomes sharpened further when sidewall 55 retreats (col. 1, lines 60-62). On page 9 of the instant Office Action, the Examiner asserts that the sidewall is composed of layers 20 and 30. The Applicants respectfully disagree. The sidewall 55 is associated with the insulator 50 that is filled into

trench 45 (col. 1, lines 51-55). The retreat of sidewall 55 does not involve removing further portions of layers 20 and 30, but involves the retreat of insulator 50 away from the trench corner 17. Thus, Lin fails to disclose, teach or fairly suggest “isotropically etching additional portions of the material from the region of the material to sharpen the corner” as expressly claimed in the Applicants’ invention.

Pan is directed to forming a shallow trench isolation structure. Pan discloses dry etching a substrate 102 to form a trench 112 (col. 3, lines 64-65). Pan also discloses cleaning the trenched structure 118 (col. 4, lines 6-8). However, Pan fails to disclose, teach or fairly suggest “isotropically etching additional portions of the material from the region of the material to sharpen the corner” as expressly claimed in the Applicants’ invention.

Inherency

The Examiner asserts that etching the cladding material to define a rounded corner is inherent in Huang (Office Action, page 3.) The Examiner also asserts that further removing portions of the material from the material to sharpen the corner is inherent in Pan (Office Action, pages 5 and 10.) The Applicants respectfully disagree.

The Examiner must provide a rationale or evidence tending to show that a feature is inherent in the reference (M.P.E.P. § 2112). The mere fact that a certain characteristic may be present in the reference is not sufficient to establish the inherency of that feature (M.P.E.P. § 2112 *citing In re Rijckaert*, 9 F.3d 1531 (Fed. Cir. 1993)) (emphasis in original). To establish inherency, the extrinsic evidence must make clear that the missing feature is necessarily present in the thing described by the reference and that persons of ordinary skill

would recognize that the feature is necessary (M.P.E.P. § 2112 *citing In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999)).

Huang is directed to fabricating a structure with a rounded corner to produce an integrated circuit (IC) with more reliable performance (col. 5, lines 1-6). The Examiner asserts on page 3 of the instant Office Action, that etching cladding material to define a rounded corner is inherent in Huang because Huang teaches a similar anisotropic etching through a photoresist as the Applicants, therefore a rounder corner is inherently formed. However, the sharp corner 307 of Huang is formed when a portion of pad oxide layer 302 is etched away during the pre-liner cleaning process (col. 4, lines 11-15.) Huang does not suggest that this cleaning process is an anisotropic etch. Plus, this cleaning process forms an “undesired sharp corner 307,” not a rounded corner, as asserted by the Examiner (col. 4, lines 14-15). Thus, Huang does not inherently disclose etching a cladding material to define a rounded corner, as expressly claimed by the Applicants.

Further, Huang discloses a Rapid Thermal Process (RTP) that melts sharp corner 307 into a rounded corner 316 (col. 4, lines 62-65). Huang describes the advantages of melting to create a rounded corner because of being a simple process and resulting in savings in a thermal budget (col. 5, lines 9-22). Thus, Huang specifically discloses creating a rounded corner through melting in order to achieve certain advantages. One of ordinary skill in the art would not recognize anisotropically etching a rounded corner as inherently present in Huang.

On pages 5 and 10 of the instant Office Action, the Examiner asserts Pan inherently discloses further removing portions of the material from the material to sharpen the corner as

expressly claimed in the Applicants' invention. The Examiner acknowledges this feature is not explicitly taught by Pan. Pan discloses stripping the photoresist and cleaning the trenched structure 118 prior to growing the oxide layer 120 (col. 4, lines 6-8.) However, an additional "wet etch" as suggested by the Examiner would change the trenched structure 118, and not clean the trenched structure 118 as disclosed by Pan. Therefore, "isotropically etching additional portions of the material from the material to sharpen the corner" as expressly claimed by the Applicants is not inherent in Pan.

Also, the Applicants submit the Examiner is misapplying inherency in Pan. The inherent characteristic must be present in the prior art itself (M.P.E.P. § 2112.) The Examiner's rationale for the inherency of the feature is based on the assertion that Huang and Lin teach sharpening a corner using wet etchants. However, the Examiner has failed to show how Pan itself inherently discloses "isotropically etching additional portions of the material from the material to sharpen the corner."

Conclusion

Thus, Huang, Lin, and Pan, whether taken singularly or in combination, fail to disclose, teach, or fairly suggest at least one of the expressly recited limitations of the Applicants' invention as presently claimed. Indeed, Huang teaches away from the claimed invention. Further, the Applicants submit that Huang and Pan do not inherently contain the characteristics as asserted by the Examiner. Accordingly, the present invention would not be anticipated by nor rendered obvious by the cited references. Independent claim 17 distinguishes for at least the same reasons as claim 1. Claims 2-16 and 18-21 are dependent claims and distinguish for at least the same reasons as their independent base claims in

addition to adding further limitations of their own. Therefore, the Applicants respectfully request that the instant § 102 and § 103 rejections be withdrawn.

The Applicants submit that in view of the amendments and remarks set forth herein, all instant rejections have been overcome. Therefore, the Applicants respectfully request the Examiner to reconsider and withdraw all presently outstanding rejections and issue a timely Notice of Allowance in this case.

Charge Deposit Account

Please charge our Deposit Account No. 02-2666 for any additional fee(s) that may be due in this matter, and please credit the same deposit account for any overpayment.

Respectfully submitted,
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Date: 10-20-03


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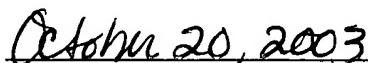
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Reply to Final Office Action of Aug. 19, 2003

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Examiner: Song
Art Unit: 1765